STEPUKHOVICH, A.D.; KAPLAN, Ye.G.; NIKITINA, Yo.Ye.

Tetramethylethylene as a new inhibitor for the cracking of paraffin hydrocarbons (with summary in English). Zhur.fiz.khim. 31 no.7:1437-1444 Jl '57. (MIRA 10:12)

1. Saratovskiy gosudarstvennyy universitet im. N.G.Chernyshevskogo.
(Dimethylbutylene) (Inhibition (Chemistry)) (Cracking process)

STEPUKHOVICH, A.D.; NIKITIN, Ye.Ye.

Retarding and accelerating the cracking of paraffin hydrocarbons by tetramethylethylene additions [with summary in English]. Zhur.fiz.khim.31 no.8:1677-1686 Ag '57. (MIRA 10:12)

1. Saratovskiy gosudarstvennyy universitet im. N.G.Chernyshevskogo.
(Cracking process) (Paraffins) (Ethylene)

AUTHOR: Stepukhovich, A.D., Nikitin, Ye.Ye. 76-11-3/35

TITLE: On the Kinetics and the Mechanism of Tetramethylethylene Decay (O kinetike i mekhanizme raspada tetrametiletilena)

PERIODICAL: Zhurnal Fizicheskoy Khimii, 1957, Vol. 31, Nr 11, pp. 2400-2402 (USSR)

ABSTRACT: A possible explanation for the anomalous decay kinetics of tetramethylethylene is given on the basis of the hypothesis of the heterogeneous radical, but not a chain-decay of tetramethylethylene. The facts stated concerning the decay of tetramethylethylene by means of the experiment can be explained by considering their decay to be a successive radical reaction with a heterogeneous forming of active centers. There are 5 Slavic references.

ASSOCIATION: Saratov State University imeni N.G.Chernyshevskiy (Saratovskiy gosuniversitet im. N.G.Chernyshevskogo)

SUBMITTED: August 8, 1955

AVAILABLE: Library of Congress

Card 1/1

STEFUKHOVICH, A.D.

Kinetics and mechanism of autoinhibition of chain cracking of paraffin hydrocarbons by decomposition products. Uch.zap. Sar.un. Vyp.fiz. 56: 51-99 '57. (MIRA 12:11)

(Paraffins) (Cracking process)

[illegible], A.D., [illegible] "[illegible] of [illegible] of [illegible] of [illegible] of [illegible] [illegible] the [illegible] [illegible] of [illegible] of [illegible] [illegible]." [illegible], 1959. 31 p. (Acad Sci USSR. [illegible] Chem Physics), 500 copies. List of author's works: p. 30-31 ([illegible]) [illegible]

SOV/76-32-10-27/39

5(4)
AUTHOR: Stepukhovich, A. D.

TITLE: On the Nature of the Negative Temperature Coefficient of the Rate of Radical Recombination (O prirode otritsatel'nogo temperaturnogo koeffitsiyenta skorosti rekombinatsii radikalov)

PERIODICAL: Zhurnal fizicheskoy khimii, 1958, Vol 32, Nr 10, pp 2415- 2417 (USSR)

ABSTRACT: The statistical interpretation makes possible only formally a negative value of this magnitude; physically this is, however, hardly possible. In the case of a trimolecular reaction the negative activation energy becomes understandable as excess energy which is transmitted away by means of the kinetic (or radiation) energy. A negative temperature coefficient of the reaction rate was first observed in the trimolecular reaction $2\,NO+O_2 \rightleftarrows 2\,NO_2$ (Ref 3). A negative value of the activation energy in bimolecular recombinations of the CH_3 radicals (or more complex radicals) does

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not have any sense. According to the law of the change of the steric factor (s) of the bimolecular reaction with the temperature the equation

$$\frac{s_{T_2}}{s_{T_1}} = \left(\frac{T_1}{T_2}\right)^{3,5}$$ holds for the CH_3 radicals (Ref 4).

An increase in temperature from 300 to 1000°K must lead to a decrease in the steric factor by about the 60-fold, which corresponds to a negative activation energy of the recombination $E_{rek} = -3,6$ kcal. This value differs from that found experimentally by less than 1 kcal, and lies just on the limit of error. A comparative table of the values s_{T_1}/s_{T_2} shows good agreement between the calculated and experimental values; the latter are, however, a little lower as a rule. An activation value of 0,5-1 kcal/mol had to be assumed for a full agreement of the recombination reaction

of the CH_3 radicals. Thus, a decrease in the steric reaction factor with the increase in temperature is assumed to be the explanation of the negative temperature coefficients found. The increase in temperature makes more difficult the formation of a configuration regulated in a better way and is related to a negative activation entropy. There are 1 table and 4 references, 2 of which are Soviet.

ASSOCIATION: Saratovskiy gosudarstvennyy universitet im.N.G.Chernyshevskogo (Saratov State University imeni N.G.Chernyshevskiy)

SUBMITTED: May 21, 1957

SOV/76-32-11-17/32

5(4), 5(1)
AUTHOR: Stepukhovich, A. D.

TITLE: On the Inhibition Mechanism of Hydrocarbon Cracking by Inhibitor Addition (O mekhanizme tormozheniya krekinga uglevodorodov dobavkami ingibitorov)

PERIODICAL: Zhurnal fizicheskoy khimii, 1958, Vol 32, Nr 11, pp 2571-2574 (USSR)

ABSTRACT: Calculations made earlier of the activation energy (E_{inh}) of the inhibition mentioned in the title (Ref 3) showed that the E_{inh} depends on the nature of the active radical that further develops the chain, as well as on the inhibitor. E_{inh} changes from 5 to 8 kcal, it is, however, independent of the nature of the hydrocarbon (if the active radical remains the same). It is assumed that the inhibiting effect of the olefins (propylene, isobutylene) on the cracking of alkanes takes place in an exchange of the active radicals (H, CH_3) by less active ones (of the type of the allyl radical) according to the following reaction: $R\ (H,\ CH_3) + M_{olefin} \rightleftharpoons RH + R_{allyl}$.

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On the Inhibition Mechanism of Hydrocarbon Cracking by Inhibitor Addition

The various changes of the reaction constant (k_{inh}) of the inhibition by the inhibitors with the temperature on the addition of different inhibitors are explained by the change of the steric factor (s_{inh}) of the above-mentioned reaction. The assumption on the exchange of active radicals by inactive radicals is proved by the value $E_{inh} \sim 7$ kcal/mol. almost equally obtained for propylene and butylene. The reaction velocity constants for various hydrocarbons were calculated according to an equation by N. N. Semenov (Ref 6) for spherical vessels and are given (Table 1). The separation of the H atoms from the olefin molecule takes place in the methyl group at the weakest C-H bond in the β-position to the double bond. An accumulation of the methyl groups increases the inhibiting effect.
There are 1 table and 7 Soviet references.

ASSOCIATION: Gosudarstvennyy universitet im. N. G. Chernyshevskogo, Saratov (State University imeni N. G. Chernyshevskiy, Saratov)

SOV/76-33-1-2/45

5(4)
AUTHORS: Stepukhovich, A. D., Birger, B. I.

TITLE: Kinetics and Mechanism of the Decomposition of Hydrocarbons (Kinetika i mekhanizm raspada uglevodorodov) XIII. Kinetics of the Butane Cracking Inhibited by Propylene Additions (XIII. Kinetika krekinga butana, zatormozhennogo dobavkami propilena)

PERIODICAL: Zhurnal fizicheskoy khimii, 1959, Vol 33, Nr 1, pp 8-14 (USSR)

ABSTRACT: The theory of the chain cracking of hydrocarbons inhibited by additions of various inhibiting agents was developed already some years ago (Refs 1-4). According to Hinshelwood (Ginshel'vud) (Ref 6) and the results of some investigations (Ref 5), the butane cracking is carried out in a complicated kinetic process. This assumption is , however, unfounded considering the decomposition of the radical chains of the alkanes and the structure of butane. The present tests were carried out to clarify this question, to determine the activation energies of the inhibiting reaction, and to establish the working mechanism of propylene. The cracking of butane with propylene additions was carried out in a vacuum unit the description of which has

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Kinetics and Mechanism of the Decomposition of Hydrocarbons. XIII. Kinetics of the Butane Cracking Inhibited by Propylene Additions

already been given together with the working method (Ref 7). The pressure was measured by means of a diaphragm pressure gage, the temperature by means of a potentiometer PP. Two series of investigations were made at 540° and 580°C respectively (Table 1). The results of the investigations showed, after a treatment of the reaction walls (quartz glass) with HF, that an enlargement of the specific surface intensifies the inhibiting reaction which points to a heterogeneous origin of the chain formation and, on the other hand, to a homogeneous fission of the chains in the cracking reaction (Refs 1,8). According to the calculations by A. D. Stepukhovich, the value 13.4 kcal is given for the activation energy of the admission of CH_3 radicals at the walls of the quartz vessel. The determinations made according to the method of inhibiting additions showed a value of 2.7 kcal for the activation energy of the reaction of propylene with H radicals, and a value of 11 kcal for the reaction with CH_3 radicals. The decomposition of butane does not constitute an exception from the general laws of reaction kinetics of the inhibited radical chain

SOV/76-33-1-2/45

Kinetics and Mechanism of the Decomposition of Hydrocarbons. XIII. Kinetics of the Butane Cracking Inhibited by Propylene Additions

cracking. There are 3 tables and 11 references, 10 of which are Soviet.

ASSOCIATION: Saratovskiy gosudarstvennyy universitet im. N. G. Chernyshevskogo (Saratov State University imeni N. G. Chernyshevskiy)

SUBMITTED: November 30, 1956

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Stepukhovich, A.D

PHASE I BOOK EXPLOITATION SOV/4941

Mezhvuzovskoye soveshchaniye po khimii nefti, Moscow, 1956.

Sbornik trudov Mezhvuzovskogo soveshchaniya po khimii nefti (Collection of Transactions of the Inter-University Conference on Petroleum Chemistry) [Moscow] Izd-vo Mosk. univ., 1960. 313 p. Errata slip inserted. 1,600 copies printed.

Organizing Committee of the Conference: Chairman: B. A. Kazanskiy, Academician; Vice-Chairman: S. I. Khromov, Docent; G. M. Panchenkov, Professor; A. F. Plate, Professor; Secretary: Ye. S. Balenkova, Scientific Worker. Editorial Board: Resp. Ed.: A. F. Plate; I. V. Gostunskaya, I. M. Tits-Skvortsova, L. A. Erivanskaya.

PURPOSE: This collection of articles is intended for the teaching staff of universities and schools of higher education training specialists for the petroleum and petroleum-refining industries.

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COVERAGE: The collection includes articles dealing with the present state of the petroleum industry, the scientific research problems in petroleum chemistry, the chemistry of petroleum, the composition of petroleum and petroleum products, the scientific principles of refining petroleum into motor fuels and lubricants, and the manufacture of synthetic products from hydrocarbon gases and petroleum. One article discusses the effect of chemical composition and additives on fuel combustion in jet engines. The material was presented at the Inter-University Conference on Petroleum Chemistry, held at the Moscow State University imeni M. V. Lomonosov November 26-28, 1956. No personalities are mentioned. References accompany most of the articles.

TABLE OF CONTENTS: None given

The authors and the titles of articles are as follows:

Introduction by B. A. Kazanskiy, Academician

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FROST, Andrey Vladimirovich, prof. [deceased]. Prinimali uchastiye: BUSHMAKIN, I.N.; VVEDENSKIY, A.A.; GRYAZNOV, V.M.; DEMENT'YEVA, M.I.: DINTSES, A.I.; DOBRONRAVOV, R.K.; ZHARKOVA, V.R.; ZHERKO, A.V.; IPAT'YEV, V.N.; KVYATKOVSKIY, D.A.; KOROBOV, V.V.; MOOR, V.G.; NEMTSOV, M.S.; RAKOVSKIY, A.V.; REMIZ, Ye.K.; RUDKOVSKIY, D.M.; RYSAKOV, M.V.; SEREBRYAKOVA, Ye.K.; STEPUKHOVICH, A.D.; STRIGALEVA, N.V.; TATEVSKIY, V.M.; TILICHEYEV, M.D.; TRIFEL', A.G.: FROST, O.I.; SHILYAYEVA, L.V.; SHCHEKIN, V.V.. DOLGOPOLOV, N.N., sostavitel'; GERASIMOV, Ya.I., otv.red.; SMIRNOVA, I.V., red.; TOPCHIYEVA, K.V.; YASTREBOV, V.V., red.; KONDRASHKOVA, S.F., red. izd-va; LAZAREVA, L.V., tekhn.red.

[Selected scientific works] Izbrannye nauchnye trudy. Moskva, Izd-vo Mosk.univ., 1960. 512 p. (MIRA 13:5)

1. Chlen-korrespondent AN SSSR (for Gerasimov).
(Chemistry, Physical and theoretical)

23601
S/081/61/000/008/010/017
B110/B203

54300 1142, 1273, 1320

AUTHORS: Stepukhovich, A.D.

TITLE: Kinetics and mechanism of braking and initiating the cracking of paraffin hydrocarbons

PERIODICAL: Referativnyy zhurnal. Khimiya, no.8, 479, abstract 8M177 (8M177) (Sb. tr.Mezhvuz. soveshchaniya po khimii nefti, 1956. M., Mosk. un-t, 1960, 230 - 257)

TEXT: It had been found in previous papers by the author that the olefins: propylene, isobutylene, allene, tetramethyl ethylene, and a mixture of α- and β- butylene inhibit the cracking of hydrocarbons. On the basis of an analysis of the scheme of the radical chain reaction in consideration of homogeneous or heterogeneous radical formation with subsequent chain formation in the volume, homogeneous braking on the inhibitor molecules, and fixing of radicals to the walls, the author derives the equations for the kinetics of cracking of the individual alkanes braked by means of inhibitor admixtures: $1(W - W_o) = A + BC_{inh}$ or $1(W - W_o) = A' + B'P_{inh}$, where W is the initial rate of alkane

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Kinetics and mechanism...

cracking corresponding to the concentration of the braking admixture C_{inh} (or the partial pressure of the admixture P_{inh}); W_o rate of completely braked cracking or residual rate; A and B (or A' and B') - coefficients dependent on the initial pressure of hydrocarbons. These equations serve as the basis for the quantitative method of determining the rate constants of the braking reaction of chains on the inhibitor molecules and those of the chain rupture at the walls. The author studies the radical scheme of cracking by which it is possible to determine the kinetic rules governing braked - initiated cracking. He gives a survey of publications on the kinetics of cracking. 33 references.
[Abstracter's note: Complete translation.]

Card 2/2

S/076/60/034/007/018/042/XX
B004/B068

AUTHORS: Stepukhovich, A. D. and Naumov, Yu. P.

TITLE: Kinetics and Mechanism of Cracking of Paraffin Hydrocarbons. Effect of the Heterogeneity Factor on Kinetics and Mechanism of Cracking of Ethane and Propane

PERIODICAL: Zhurnal fizicheskoy khimii, 1960, Vol. 34, No. 7, pp. 1488-1494

TEXT: The aim of this work was to investigate the effect of the heterogeneity factor S/V on the inhibition coefficient β. S is the internal surface of the reaction vessel, and V is its volume; both β and k are empirical values of the equation for the kinetics of cracking developed by A. I. Dintses and A. V. Frost: $dx/dt = k(1 - x)/[1 - \beta(1 - x)]$ (1). The following relations were derived by Stepukhovich in Ref. 2: $k=2w_0k_3V/\alpha k_4$, and $\beta = k_4/(k_5V+\alpha k_4)$ (2). The inhibition coefficient β is thus given by the rate constant k_4 of chain inhibition in the volume for the collision

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of active radicals with inhibiting molecular reaction products, and the rate constant k_5 of radical absorption by the wall of the vessel; rate k_3 is valid for the development of chains in the volume; w_o is a constant; α is the portion of the forming inhibiting product in the volume V. Ethane was cracked at 600°C and propane at 580°C and 10, 20, and 40 mm Hg. A spherical and a cylindrical reaction vessel with equal volume were used, and an effect of the geometrical shape was established. The cracking rate in the spherical vessel was only one-sixth to one-third of that found in the cylindrical vessel. This is explained on the basis of the chain theory which says that chains form on the wall, but are ruptured both on the wall and in the volume of the vessel. For the chain length ν, the relation $\nu = \nu_s \left\{1 - 0.1gd^2/D+0.01(gd^2/D^2\right\}$ (5) is derived. ν_s depends on the geometrical shape of the vessel; g is the chain-rupture coefficient in the volume; D is the diffusion coefficient; and d is the diameter of the vessel. The calculated value of g is between 0.063 and 0.25 sec^{-1}. The linear

relation between the cracking rate and d bears evidence to the heterogeneous character of chain formation. Moreover, the effect of S/V was examined by packing the cylindrical vessel with quartz tubes up to different levels. With increasing degree of packing with fresh quartz tubes, i.e., the extension of the wall surface, the cracking rate decreased rapidly. From this, it is concluded that cracking has a chain-like character. On repeated cracking, aging took place when the same packing was used. The packing lost its ability to rupture chains. This is ascribed to a stable chemosorption of radicals on the packing. The inhibition coefficient β in equation (1) depends on S/V and decreases with increasing packing degree. According to Stepukhovich's theory, this indicates the heterogeneous character of the effect of inhibitors and inhibiting products. The assumption that β depends on pressure for ethane but not for propane, was experimentally confirmed. V. V. Voyevodskiy and V. A. Poltorak are mentioned. There are 5 tables and 8 Soviet references.

Kinetics and Mechanism of Cracking of Paraffin Hydrocarbons. Effect of the Heterogeneity Factor on Kinetics and Mechanism of Cracking of Ethane and Propane

S/076/60/034/007/018/042/XX
B004/B068

ASSOCIATION: Saratovskiy gosudarstvennyy universitet (Saratov State University)

SUBMITTED: September 22, 1958

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84633

S/076/60/034/010/015/022
B015/B064

11.5100

AUTHORS: Stepukhovich, A. D., and Derevenskikh, L. V.

TITLE: The Mechanism of the Thermal Decomposition of Ethane and the Composition of the Resulting Products

PERIODICAL: Zhurnal fizicheskoy khimii, 1960, Vol. 34, No. 10, pp. 2315 - 2319

TEXT: The decomposition mechanism in ethane cracking has hitherto not been completely clarified. The present paper investigates the formation of methane in ethane cracking at 612°C and 635°C, pressures of 20 mm Hg and 180 mm Hg, and extents of conversion of up to 50%. The dependence of the composition of the cracking products on temperature, pressure, and the extent of conversion was studied by means of an apparatus used for gas-volumetric chromatographic analyses (Refs. 20-22). Results are tabulated. Experimental data show that reaction chains are formed, and that the apparent chain length is reduced with increasing extent of conversion. This is due to the retarding effect of the cracking products upon the rate of decomposition. Special

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84633

The Mechanism of the Thermal Decomposition of Ethane and the Composition of the Resulting Products

S/076/60/034/010/015/022
B015/B064

experiments (by Ye. K. Mogileva and N. S. Sukhova) showed that small additions of allene or acetylene inhibit ethane cracking considerably the yields of ethylene and hydrogen thus decreasing considerably and that of methane increasing noticeably. This inhibitory effect of the cracking products is to be observed up to an extent of conversion of 25%. The limit of the chain length does not depend on pressure and only little on temperature and the residual chain reaction (with a chain length of the order of 7 - 8 links). The results show that the ratio $CH_4/\left[1/2(H_2 \quad C_2H_4)\right]$ does not remain constant with a change of pressure, which means that methane is also formed by side reactions. The ratio $(H) / (CH_3) \approx 9\ s_2/s_1$ was derived from the results of analysis, with $s_2/s_1 \approx 10^{-2} - 10^{-3}$ (Ref. 23) being assumed, i.e., the concentration of H is smaller by two orders of magnitude than that of CH_3. For 635°C the concentration of H is determined to be $(H) \approx 10^{-12}$ moles/l.

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The Mechanism of the Thermal Decomposition of Ethane and the Composition of the Resulting Products

S/076/60/034/010/015/022
B015/B064

In view of the fact that the dissociation to radicals proceeds heterogeneously, this value is in good agreement (with respect to its order of magnitude) with the experimental data of Sachsse (Ref. 8). There are 1 figure, 1 table, and 24 references: 8 Soviet, 10 US, 1 Canadian, 1 German, and 4 British.

ASSOCIATION: Saratovskiy gosuniversitet im. N. G. Chernyshevskogo (Saratov State University imeni N. G. Chernyshevskiy)

SUBMITTED: May 5, 1959.

Card 3/3

5.3300

S/020/60/131/06/41/071
B004/B007

AUTHORS: Gamus-Chernyavskaya, Ye. M., Reznikova, S. Sh., Stepukhovich, A. D.

TITLE: Composition of the Products Obtained by Initiated Cracking of Gaseous Alkanes and the Mechanism of This Process

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol. 131, No. 6, pp. 1376 - 1379

TEXT: The authors investigated the cracking of propane, butane, and isobutane, which was initiated by the addition of azomethane. The reaction products were chromatographically determined. The results are shown in table 1. Under the experimental conditions (propane: 364°, 80 torr, 10 min; butane: 355°, 70-76 torr, 10 min) no thermal cracking occurred as yet without initiator. Small admixtures (1-3%) of azomethane, however, caused intensive cracking. Unlike what is the case with thermal cracking, dehydrogenation in the case of propane predominates over demethanization. The CH_4 yield is nearly double that of ethylene. With increasing addition of azomethane (7-10%) the ethylene yield becomes 7.5 times greater, and the C_3H_6 yield is only doubled. The CH_4 yield, however, remains greater than the C_2H_4 yield. These results prove the initiating action of the CH_3 radicals. At

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azomethane concentrations of between 3 and 10% the ratio C_2H_4 : C_3H_6 increases from 0.25 to 1, approximately proportional to the concentration of azomethane. In the initiated cracking of n-butane, the ratio C_3H_6 : C_2H_4 : H_2 equals 10 : 2.5 : 1, whereas in thermal cracking (548°, 180 torr, 6 min) this ratio is 9 : 3.5 : 1 (Ref. 4). Also here demethanization predominates. In isobutane the ratio C_3H_6 : C_2H_4 : H_2 in initiated cracking is 2 : 6 : 1, and in thermal cracking 7 : 3 : 1. With increased addition of azomethane, the action of the initiator is limited, as predicted by the authors (Ref. 5). The formation of propane in the initiated cracking of isobutane has as yet not been explained. The authors suggest trying initiated cracking on an industrial scale as a new method. They thank R. V. Kosyreva for her collaboration in analyses. There are 1 table and 5 Soviet references.

80095

Composition of the Products Obtained by Initiated Cracking of Gaseous Alkanes and the Mechanism of This Process

S/020/60/131/06/41/071
B004/B007

ASSOCIATION: Saratovskiy gosudarstvennyy universitet im. N. G. Chernyshevskogo (Saratov State University imeni N. G. Chernyshevskiy)

4

PRESENTED: December 7, 1959, by V. N. Kondrat'yev, Academician

SUBMITTED: November 30, 1959

Card 3/3

81706
S/020/60/132/05/36/069
B011/B126

53200

AUTHORS: Petrosyan, V. I., Kosyreva, R. V., Stepukhovich, A. D., Shul'kevich, G. V.

TITLE: The Composition of the Products and the Kinetics of Butane Cracking Initiated by Additions of Ethylene Oxide

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol. 132, No. 5, pp. 1103 - 1106

TEXT: The authors studied the above subject by the statistic method in a high vacuum apparatus. This apparatus consisted of three parts connected in series: a) a kinetic apparatus to study butane cracking on the basis of pressure change; b) chromatographic separating apparatus; c) hydrogen and methane combustion apparatus, also used to detect CO. Table 1 and Figs. 1-3 show the results of cracking at 450°C. It follows from Table 1 that small additions of ethylene oxide effect considerable butane cracking. Cracking does practically not occur without these additions at 450°. All the characteristic products of thermal cracking at higher tempera-

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81706

The Composition of the Products and the Kinetics of Butane Cracking Initiated by Additions of Ethylene Oxide

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B011/B126

tures (550-600°C) are contained in the products of cracking thus initiated. Additions of 1-3% are the most effective. If the ethylene oxide additions are increased, the initiating effect reaches a saturation point (predicted in Ref. 13). With an ethylene oxide addition of 10%, the cracking attains about 30%. The self-decomposition of ethylene oxide cannot explain such an intensive butane decomposition, nor the composition of the products, as pure ethylene oxide gives only small quantities of H_2, CH_4, C_2H_4, and C_3H_8 on decomposition (Table 1). The paired products of thermal cracking (at higher temperatures) are formed in the usual quantity ratios ($CH_4 - C_3H_6$, $C_2H_6 - C_2H_4$, and $H_2 - C_4H_8$) on initiated cracking. However, with a low concentration of the initiator, demethanization and de-ethanization occur to the same extent, not as in ordinary cracking. When the concentration of ethylene oxide is raised (3-5%), demethanization begins to prevail, as is the case in normal cracking. This shift is best explained by the hypothesis of the isomerization of the butyl radicals to secondary butyl radicals. The decomposition of the oxide explains the higher yield of CH_4, C_2H_6, and H_2,

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The Composition of the Products and the Kinetics of Butane Cracking Initiated by Additions of Ethylene Oxide

as opposed to normal cracking. A similar pattern is followed by isobutyl cracking. The starting rate of initiated butane cracking rises with a rise in the concentration of the initiator. In each case it decreases with time, and reaches a certain limit, which is practically independent of the initial concentration of the addition (Fig. 2). The kinetics of initiated cracking have, as have those of normal cracking, the character of a process which is self-retarding by the products, and is described by the equation of Dintsess and Frost (Fig. 3). Ethylene oxide also has an inhibiting effect (Equations (I) - (IV)). The ethylene oxide rate-constant that was obtained, and the activating energy of the decomposition agreed with values previously (Refs. 1,7) established. The authors mention papers by A. I. Terenin (Ref. 12). There are 3 figures, 1 table, and 17 references: 9 Soviet and 8 American.

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81706

The Composition of the Products and the Kinetics of Butane Cracking Initiated by Additions of Ethylene Oxide

S/020/60/132/05/36/069
B011/B126

ASSOCIATION: Saratovskiy gosudarstvennyy universitet im. N. G. Chernyshevskogo (Saratov State University imeni N. G. Chernyshevskiy)

PRESENTED: January 8, 1960, by A. V. Topchiyev, Academician

SUBMITTED: July 10, 1960

Card 4/4

21571

S/190/61/003/009/006/016
B104/B101

15.8600 also 1209 1372

AUTHORS: Stepukhovich, A. D., Ulitskiy, V. A.

TITLE: Steric factors of radical and molecular polymerizations of ethylene and propylene

PERIODICAL: Vysokomolekulyarnyye soyedineniya, v. 3, no. 9, 1961, 1341-1346

TEXT: The knowledge of steric factors in the reactions of chain growth, of transfer, and chain breaking in the radical or molecular mechanism is necessary since these factors determine the reactivity of polymer radicals in the initial stages at low activation energy of chain growth. The ratio between radical and molecular polymerization in the polymerization of ethylene (E) and propylene (P) is unknown. The conception of steric hindrance for low molecular compounds and radicals which was developed by the first author (Ref. 4: Dokl. AN SSSR, 92, 127, 1953; Uspekhi khimii, 25, 263, 1956) might explain these relationships. According to this method, the steric factors of chain growth in radical and molecular polymerizations of E and P are calculated on the first links. The configurations

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assumed in the calculations of activated complexes are based on the assumption that their structure is similar to that of the end products. X-ray analysis showed, for the end products, paraffin-like structure with stretched zigzag chain. The primary bimolecular compound for E is butene-1. To calculate the "rotational sums of states", the coordinates of atoms, reagents, and activated complexes were first calculated, then the product of principal moments of inertia was determined according to V. M. Gryaznov and A. V. Frost (Ref. 7: Statisticheskiye metody rascheta termodinamicheskykh velichin (Statistic methods of calculating thermodynamic values), M., 1939). The corresponding frequencies (Ref. 6: L. M. Sverdlov et al.: Optika i spektroskopiya, 5, 354, 1958) were substituted into the equation for the "vibrational sum of states". The steric factors were calculated from

$$s = \gamma \frac{kT}{hZ} \cdot \frac{Q^{\cdot}_{A\ldots B}}{Q_A Q_B} \exp\left[-\frac{1}{2} + T\frac{d}{dT}\ln\left(\gamma \frac{Q^{\cdot}_{A\ldots B}}{Q_A Q_B}\right)\right]. \qquad (1).$$

Table 2 gives the factors for molecular polymerization of E and P. In radical polymerization, the factor at the beginning of growth with CH_3

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S/190/61/003/009/006/016
B110/B101

radicals is $8.4 \cdot 10^{-5}$, with addition of ethylene to the propyl radical $8.4 \cdot 10^{-7}$. On formation of amyl and hexyl radicals, the steric factor slightly decreases, and remains constant on further additions. Also for the lower factors of radical polymerization of P (10^{-7}-10^{-10}) the steric factors considerably drop only in the initial stages. A comparison of the steric factors of both types of polymerization shows that, under the same conditions, radical polymerization must predominate over molecular polymerization, owing to the low activation energy of the former (4-6 kcal) as compared with that of the latter (38-40 kcal). The abrupt decrease of the high steric factor of dimerization on transition to the trimer explains the fact that in some unsaturated compounds (isobutylene etc.) molecular polymerization does not go beyond dimerization. The tendency of steric factors to become constant already after the first 3-4 links confirms the empirical assumption of an equal reactivity of polymer radicals of one monomer having different lengths. When estimating the reactivity of radicals, the steric factors in the reaction with monomers will have to be considered. This also applies to transfer and chain breaking reactions. There are 3 figures, 2 tables, and 10 Soviet references.

Card 3/3

S/076/61/035/003/012/023
B121/B203

AUTHORS: Stepukhovich, A. D., Kosyreva, R. V., and Petrosyan, V. I.

TITLE: Kinetics and mechanism of hydrocarbon decomposition. I. Mechanism of thermal propane cracking

PERIODICAL: Zhurnal fizicheskoy khimii, v. 35, no. 3, 1961, 600-604

TEXT: The authors studied the composition of reaction products of thermal propane cracking as dependent on the degree of decomposition, pressure, and temperature by gas-chromatographic analyses. The analytical results are tabulated. Propane cracking at 590°C was found to give equal amounts of H_2 and C_3H_6, as well as CH_4 and C_2H_4, and also detectable amounts of ethane at low pressures (20 mm Hg) and low decomposition degree (about 10%). With increasing degree of decomposition and pressure, propane cracking mainly yields methane and ethylene; also the yield in hydrogen and propylene is nearly trebled. The ethane content in the reaction products also rises with increasing degree of decomposition and pressure. The formation of ethane in thermal propane cracking is explained with a radical chain mechanism. The

Card 1/4

Kinetics and ...

formation of methane and ethylene in propane cracking is explained with the decomposition of propyl radicals according to the equation $CH_3CH_2\dot{C}H_2 \rightleftharpoons \dot{C}H_3 + C_2H_4$ (5). At a high degree of decomposition (60-70%), less ethylene is formed due to secondary reactions (polymerization, hydrogenation). The formation of propylene and hydrogen is explained with the decomposition of isopropyl radicals according to the equation $CH_3\dot{C}HCH_3 \rightleftharpoons C_3H_6 + \dot{H}$ (6). There are 1 table and 9 references: 8 Soviet-bloc and 1 non-Soviet-bloc. The reference to the English-language publication reads as follows: F. J. Stubbs, C. Hinshelwood, Proc. Roy. Soc. A., 20, 458, 1949.

ASSOCIATION: Saratovskiy gosudarstvennyy universitet im. G. N. Chernyshevskogo (Saratov State University imeni G. N. Chernyshevskiy)

SUBMITTED: July 3, 1959

Card 2/2

STEPUKHOVICH, A.D.; KOSYREVA, R.V.; PETROSYAN, V.I.

Kinetics and mechanism of the decomposition of hydrocarbons. Mechanism of the thermal cracking of butanes. Zhur.fiz.khim. 35 no.6:1331-1336 Je '61. (MIRA 14:7)

1. Saratovskiy gosudarstvennyy universitet imeni N.G.Chernyshevskogo, kafedra khimicheskoy fiziki.
(Butane) (Cracking process)

STEPUKHOVICH, A.D.; LAPSHOVA, N.I.; YEFIMOVA, T.D. (Saratov)

Effect of the chemical structure of the solvent on the kinetics and mechanism of Menshutkin's reaction. Zhur.fiz.khim. 35 no.11:2532-2539 N '61. (MIRA 14:12)

1. Saratovskiy universitet imeni N.G. Chernyshevskogo.
(Solvents)
(Chemical reaction, Rate of)

S/076/61/035/011/007/013
B110/B147

AUTHORS: Stepukhovich, A. D., and Ulitskiy, V. A.

TITLE: Steric factors of the recombination reaction, the disproportionation of radicals and of their formation from molecules

PERIODICAL: Zhurnal fizicheskoy khimii, v. 35, no. 11, 1961, 2569-2575

TEXT: The steric factors of the bimolecular reactions

1) $H + H = H_2$,
2) $H + \dot{C}H_3 = CH_4$.
3) $H + \dot{C}_2H_5 = C_2H_6$.
4) $H + n\text{-}\dot{C}_3H_7 = C_3H_8$.
5) $Cl + H_2 = H + HCl$,
6) $Br + H_2 = H + HBr$,
7) $\dot{C}H_3 + \dot{C}H_3 = C_2H_6$,
8) $H_2 + C_2H_4 = H + C_2H_5$,
9) $H_2 + C_2H_3 = H + \dot{C}_2H_5$.

(A)

Steric factors of the ...

were calculated from

$$S = \gamma \frac{kT}{h} \frac{1}{z} \frac{Q^*_{A\ldots B}}{Q_A Q_B} \exp\left[-\frac{1}{2} + T\frac{d}{dT}\left(\ln T \frac{Q^*_{A\ldots B}}{Q_A Q_B}\right)\right] \qquad (1),$$

where Q_A, Q_B, $Q^*_{A\ldots B}$ = total partition function of the reactants. A and B and the partition function of the activated complex A...B; z = number of collisions per particle; γ = non-adiabatic reaction coefficient; T = absolute temperature; k and h = Boltzmann and Planck constants, respectively. γ was assumed to equal unity. The calculation was related to 900°K. The geometric configurations of the particles in reactions (1)-(9) are presented in Scheme 1. The following values are shown in Table 1: diameter z; statistical weights g; symmetry numbers σ; products of the main moments of inertia I_1, I_2, I_3, of rotation Q_r, of vibration Q_v, of translation Q_t of the partition functions, and of the values of the exponent in Eq. (1). These values were determined from the geometric configurations and vibrational spectra of the reacting particles and of the

activated complex. Steric factors calculated from Eq. (1) and from data given in Table 1 for reactions (1)-(9) are listed in Table 2. Even the steric factor of the recombination reaction of the hydrogen atom is not 1 but of the order of 0.1. The steric factor is further lowered when the trimolecular recombination of the H atoms is taken into account. When CH_3 is substituted for one hydrogen atom, an abrupt decrease of the steric factor (by two orders) occurs. A continuous decrease takes place when the size of the radical is increased (C_2H_5, C_3H_7). When CH_3 radicals are recombined, the steric factor becomes by one order lower than in the case of similar reactions involving H and CH_3. Low steric factors of the order of 10^{-3} are obtained for elementary substitution reactions of Cl and Br with H_2. Considering $S_{T_1}/S_{T_2} = (T_2/T_1)^2$ and relating the factors in Eqs. (6) and (7) to 300°K, one finds $3 \cdot 10^{-2}$ and $4 \cdot 10^{-2}$, while $8 \cdot 10^{-3}$ and $9 \cdot 10^{-3}$ are obtained quantum-mechanically. Radical-forming reactions between H_2, C_2H_2, and C_2H_4 and the corresponding disproportionation reactions of the radicals have steric factors ranging from 10^{-3} to 10^{-4}. The

variation of the geometrical dimensions due to the structural indefinity of the intermediate complex has no effect on the calculated low steric factor. The relationship between the reactivities of radical and molecular reactions which will be studied in a later paper. A paper of N. N. Semenov is mentioned. There are 9 schemes, 2 tables, and 18 references: 14 Soviet and 4 non-Soviet. The three references to English-language publications read as follows: K. U. Ingold, F. P. Lossing, J. Chem. Phys., 21, 368, 1953; E. Bauer, Ta-You Wu, J. Chem. Phys., 21, 736, 1953; J. R. Dingle, D. I. Le Roy, J. Chem. Phys., 18, 1632, 1950.

ASSOCIATION: Saratovskiy universitet im. N. G. Chernyshevskogo
(Saratov University imeni N. G. Chernyshevskiy)

SUBMITTED: March 28, 1960

Table 1. Values of quantities necessary for the calculation of steric factors. Legend: (1) particles; (2) reactions with H atoms; (3) recombination reaction of CH_3 radicals; (4) disproportionation of H_2 with unsaturated hydrocarbons; (5) substitution of the type: $H_2 + X \longrightarrow HX + H$.

S/020/61/141/004/013/019
B101/B110

11.6132

AUTHOR: Stepukhovich, A. D.

TITLE: Dependence of the inhibition limit in thermal cracking of alkanes on the nature of inhibitor

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 141, no. 4, 1961, 908 - 910

TEXT: The author discusses the problem of a certain concentration of inhibitor initiating a maximum inhibition of thermal cracking which does not change any more at higher concentrations of inhibitor. The present paper deals with the interpretation of the constant reaction, i. e., the reaction of the maximum inhibited cracking. The initial cracking rate of ethane (after 10, 30, and 60 sec) was studied as a function of concentration of admixtures of isobutylene, allene, and acetylene at 612 and 635°C and an initial pressure of 10 mm Hg in iso-C_4H_8; 20 mm Hg in C_3H_4 and C_2H_2. Experimental results are shown in Fig. 1. Each inhibitor was found to inhibit cracking up to an individual limit. Therefrom, a radical - chain-residual reaction in bulk is concluded. The opinion often published in

Card 1/3 2

Dependence of the inhibition limit...

the literature and stating that all inhibitors inhibit the reaction up to the same residual reaction rate is partly due to the use of structurally similar inhibitors. C. Hinshelwood et al (see below) found an equal effect of NO and propylene on the cracking of pentane and propane which, however is of no universal importance. Papers by V. V. Voyevodskiy et al. (DAN, 90, no 5 (1953); ibid. 91, no 3 (1953)), and Ye. K. Mogileva, N. S. Sukhova (A. D. Stepukhovich, doctor's dissertation, M., 1958) are mentioned. There are 1 figure and 20 references: 16 Soviet and 4 non-Soviet. The three most recent references to English-language publications read as follows: F. I. Stubbs, C. Hinshelwood, Proc. Roy. Soc. A, 200, 4158 (1950); K. U. Ingold, F. I. Stubbs, B. C. Spall, C. Hinshelwood, Proc. Roy. Soc. A, 214, 20 (1952).

ASSOCIATION: Saratovskiy gosudarstvennyy universitet im. N. G. Chernyshevskogo (Saratov State University imeni N. G. Chernyshevskiy)

PRESENTED: March 28, 1961, by V. N. Kondrat'yev, Academician

SUBMITTED: March 27, 1961

Card 2/2

S/190/62/004/002/003/021
B110/B101

AUTHORS: Stepukhovich, A. D., Rafikov, E. A., Bortnichuk, A. L.

TITLE: Effect of colloidal platinum on kinetics and mechanism of initial block polymerization of styrene. II

PERIODICAL: Vysokomolekulyarnyye soyedineniya, v. 4, no. 2, 1962, 182 - 187

TEXT: To clarify the effect of Pt on the initial rate of styrene polymerization (Ref. 1: Vysokomolek. soyed., 4, 85, 1962) the authors tried to generalize the quantitative theory of the braking effect of inhibitors (A. D. Stepukhovich, Dokl. AN SSSR, 89, 889, 1953). A start is made from the empirical equation $1/(W_p - W_\infty) = A + Bc_{inh}$ (1). Neglecting the initiation rate of radicals as compared with the reaction rate of chain growth, $W_p = k_g[M][\dot{R}]$; $2k_{in}[M] = k_v[\dot{R}] + k_w[\dot{R}] + k_{inh}c_{inh}$ (2)

is obtained for $d[\dot{R}]/dt = 0$, where $[\dot{R}]$ = total concentration of polymer radicals in steady state; k_{in}, k_g, k_v, k_w, k_{inh} = rate constants of

Card 1/4

Effect of colloidal platinum ...

initiation, growth, and chain termination in the volume, on the walls and inhibitor particles, respectively, and $[M]$ = monomer concentration. This gives: $1/(W_p - W_\infty) = k_w/2k_{in}k_g[M]^2 + (k_{inh}/2k_{in}k_g[M]^2)\cdot c_{inh}$ (6).

The coefficients A and B are: $A = k_w/2k_{in}k_g[M]^2$; $B = k_{inh}/2k_{inh}k_g[M]^2$ (7). As the polymerization degree increases, Eq. (6) becomes: $1/(W_p - W_\infty) = Bc_{inh}$ For $c_{inh} = 0$, (1) becomes: $A \approx 1/k_g[M][\dot{R}]$ (9). The steady condition for $c_{inh} = 0$ is: $2k_{in}[M] = k_o[\dot{R}]^2$. After solution with respect to $[\dot{R}]$ and substitution into Eq. (9): $A = k_o^{1/2} / (\sqrt{2k_{in}}^{1/2} k_g[M]^{3/2})$ (10).

The ratio of B coefficients for the temperatures T_1 and T_2 is:
$B_1/B_2 = [(k_{inh})_1\cdot(k_{in}k_g)_2]/[(k_{inh})_2\cdot(k_{in}k_g)_2]$ (11). $E_{inh} = (E_{in} + E_g) - [RT_1T_2\cdot\ln(B_1/B_2)]/(T_2-T_1)$ (13) is calculated from the experimental value for B_1/B_2. $(k_{inh})_1/(k_{inh})_2 = [(k_w(B/A)_{T_1}]/[k_w(B/A)_{T_2}]$ (15). The capture energy of radicals by the walls is:

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Effect of colloidal platinum...

$E_w = (E_{in} + E_g) - [RT_1T_2\ln(A_1/A_2)] / (T_2-T_1)$ (16), where for styrene: E_{in} = 29.6 kcal/mole; E_g = 7.25 kcal/mole. Eqs. (15) and (16) hold at 80 and 95°C for 60 min polymerization. Radical recombination prevails in the volume in this case. Since the value of E_{inh} (800 cal/mole) extrapolated for the zero polymerization degree is less than the activation energy E_o (1500 cal/mole) of the recombination of polymer radicals of styrene, the inhibition reaction is faster than the recombination. The ratio of the coefficients A at 80 and 95°C is constant with 5.55 for polymerization up to < 60 min, and decreases to 3 with increasing polymerization degree. According to Eq. (16): E_w = 7250 cal/mole, which corresponds to E_g. According to Eq. (7): $A_1/A_2 = (k_w/k_{in}k_g)_{T_1} \cdot (k_w/k_{in}k_g)_{T_2}$ (17). Since $E_w = E_g$, $k_w \approx k_g$, and (17) gives: $A_1/A_2 \approx \exp[(E_{in}/R)\cdot(1/T_1 - 1/T_2)]$ (18). A transition of the initially bimolecular inhibition of styrene polymerization to a trimolecular mechanism is assumed. The change of the negative activation energy with increasing polymerization degree is probably due to

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Effect of colloidal platinum...

a gradual valence increase until coordination complexes of Pt are formed. The positive activation energy with zero polymerization degree is probably due to the bimolecular character of the reaction because of low radical concentration and pure surface of colloid particles. There are 1 figure and 4 Soviet references.

ASSOCIATION: Saratovskiy gosudarstvennyy universitet im. N. G. Chernyshevskogo (Saratov State University imeni N. G. Chernyshevskiy)

SUBMITTED: February 1, 1961

Card 4/4

S/190/62/004/004/006/019
B119/B136

AUTHORS: Stepukhovich, A. D., Bortnichuk, A. L., Rafikov, E. A.

TITLE: Effect of colloidal gold and thallium on the kinetics and mechanism of initial polymerization of styrene in block and in solution. I

PERIODICAL: Vysokomolekulyarnyye soyedineniya, v. 4, no. 4, 1962, 516-522

TEXT: Styrene was polymerized (boiling point 75.9°C) in block and in toluene solution in the presence of colloidal gold at 60, 80, and 95°C. The Au content was varied between $0.37 \cdot 10^{-4}$ and $11.84 \cdot 10^{-4}$ gram-atoms/liter. The rate of polymerization was determined from the time variations in specific viscosity. Results: In very small amounts Au acts as initiator, and in larger amounts, as inhibitor, of block polymerization. The Au-content/reaction-rate curve has a maximum which shifts to lower Au content with increasing temperature. In the range of inhibiting Au concentrations the curve obeys the Stepukhovich equation

$\left(\frac{1}{W_p - W_{p_0}}\right) = A + Bc_{inh}$; W_p = polymerization rate appropriate for the

Card 1/2

concentration c_{inh} of inhibitor, W = residual rate). No limiting inhibition value was observed with respect to Au concentration. Because of its low solubility experiments with Tl were made with minimum amounts (it was added as $Tl(NO_3)_3$ or oxidized filings), and had qualitative character only. Tl inhibited the polymerization of styrene. There are 5 figures and 2 tables.

ASSOCIATION: Saratovskiy gosudarstvennyy universitet im. N. G. Chernyshevskogo (Saratov State University imeni N. G. Chernyshevskiy)

SUBMITTED: March 9, 1961

X

Card 2/2

S/190/62/004/004/007/019
B119/3138

5.1140
15.8109

AUTHORS: Stepukhovich, A. D., Bortnichuk, A. L., Rafikov, E. A.

TITLE: Effect of colloidal gold and thallium on kinetics and mechanism of initial polymerization of styrene in block and in solution. II

PERIODICAL: Vysokomolekulyarnyye soyedineniya, v. 4, no. 4, 1962, 523-527

TEXT: This is a quantitative evaluation of the experimental results obtained in the previous paper (Vysokomolek. soyed., 4, 516, 1962). The initiating effect of minimum amounts of colloidal gold in styrene block polymerization is explained by the reaction: styrene peroxide + Au $\rightarrow$ Au^{+} + active radicals. This also explains the drop in the height of the maximum on the Au concentration/polymerization rate curve when the reaction temperature is raised. The activation energy for the inhibition of chain growth by colloidal gold particles is calculated from the temperature dependence of the coefficients A and B (in the equation $\frac{1}{W_p - W_0} = A + Bc_{inh}$; W_p = polymerization rate appropriate

Card 1/2

STEPUKHOVICH, A.D. [Stepukhovich, A.D.]; ULITKI, V.A. [Ulitskiy, V.A.]

Steric factors of the reactions of recombination, disproportionation of radicals, and their formation from the molecules. Analele chimie 17 no.2:77-84 Ap-Je '62.

IVANOVA, R.V.; STEPUKHOVICH, A.D.

Initiated cracking of ethane. Zhur. fiz. khim. 36 no.1:222-224 Ja '62. (MIRA 16:8)

1. Saratovskiy gosudarstvennyy universitet im. Chernyshevskogo.
(Ethane) (Cracking process)

STEPUKHOVICH, A.D.; BOLYCHEVSKIY , Yu.M.

Experimental verification of the theory of the inhibited chain cracking of paraffinic hydrocarbons. Zhur. fiz. khim. 36 no.1:224-225 Ja '62. (MIRA 16:8)

1. Saratovskiy gosudarstvennyy universitet im. Chernyshevskogo.
(Paraffins) (Cracking process)

STEPUKHOVICH, A.D.; EL'TERMAN, L.I.; BALAKHNIN, V.P.

Initiated cracking of propane-butane mixtures. Neftekhimiia 3 no.4:531-540 Jl-Ag '63. (MIRA 16:11)

1. Saratovskiy gosudarstvennyy universitet imeni N.G. Chernyshevskogo, kafedra khimicheskoy fiziki.

S/076/63/037/003/018/020
B101/B215

AUTHORS: Ulitskiy, V. A., Stepukhovich, A. D.

TITLE: Steric factors and constants of the reaction rate of alkyl radical recombination

PERIODICAL: Zhurnal fizicheskoy khimii, v. 37, no. 3, 1963, 689-691

TEXT: An improved method of calculating the steric factors and constants of the recombination rate for H + R = HR and R + R = R_2 is given, where R = CH_3, C_2H_5, C_3H_7, C_4H_9, CF_3. The transcendental equations r = r(j) and $\partial\varphi(r,j)/\partial j = 0$ were calculated with a ural-1 computer. The distance between two radicals in the activated complex is 5 Å at most, the steric factor of recombination is 10^{-2} - 10^{-7} according to the reacting radicals; it decreases as the radical becomes more complicated. Substitution of F for H reduces the steric factor considerably. The activation energies of recombinations are between 200 and 300 cal. The calculated constants of recombination rate are in good agreement with the experimental data, e. g. those by R. N Snow and P. E. Peck (A. I. Chem.

Steric factors and constants of the ... S/076/63/037/003/018/020
B101/B215

E. J., 5, 304, 1959). There are 2 tables.

ASSOCIATION: Saratovskiy gosudarstvennyy universitet (Saratov State University)

SUBMITTED: June 13, 1962

Card 2/2

STEPUKHOVICH, A.D.; MALANIN, V.A.; RAFIKOV, E.A.

Effect of colloidal cadmium and zinc on the kinetics and mechanism of the initial stage of block polymerization of methyl methacrylate. Vysokom. soed. 6 no.4:695-698 Ap '64. (MIRA 17:6)

1. Saratovskiy gosudarstvennyy universitet imeni N.G. Chernyshevskogo.

[illegible], I.I., [illegible]; BAZHENOVA, L.K.

Kinetics and the mechanism of the initiated decomposition of a propane-butane mixture at low pressures. Neftekhimiia 4 no.5:767-771 S-O '64. (MIRA 18:1)

1. Saratovskiy gosudarstvennyy universitet imeni N.G.Chernyshevskogo.

IVANOVA, R.V., PROTASOVA, Yu.S., STEPUKHOVICH, A.D.

Effect of the heterogeneous [illegible] and mechanism of the cracking of butanes. Neftekhimiia 5 no.1: 33-39 Ja-F '65. (MIRA 18:5)

1. Saratovskiy gosudarstvennyy universitet imeni Chernyshevskogo, kafedra khimicheskoy fiziki.

ACC NR: AP6034153 SOURCE CODE: UR/0076/66/040/010/2551/2559

AUTHOR: Stepukhovich, A. D.; Umanskiy, V. M.

ORG: Saratov State University (Saratovskiy gosudarstvennyy universitet)

TITLE: Preexponential and steric factors in certain elementary reactions of hydrogen combustion

SOURCE: Zhurnal fizicheskoy khimii, v. 40, no. 10, 1966, 2551-2559

TOPIC TAGS: hydrogen, hydrogen combustion, chemical reaction kinetics, reaction mechanism, combustion research

ABSTRACT: The kinetics of elementary reactions of hydrogen combustion at ~800K has been studied. A detailed calculation was performed of the preexponential and steric factors of the bimolecular reactions of chain propagation and branching.

$$\dot{O}H + H_2 \rightarrow H_2O + \dot{H} \quad (I)$$

$$\dot{H} + O_2 \rightarrow \dot{O}H + \cdot O \cdot \quad (II)$$

$$\cdot O \cdot + H_2 \rightarrow \dot{O}H + \dot{H}, \quad (III)$$

 UDC: 541.124/128

and of the trimolecular reaction of homogeneous chain breaking,

$$H + O_2 + M \rightarrow HO_2 + M. \qquad (IV)$$

where M = Ar. For reactions I—III the steric factors were found to be of the order of 10^{-3}, 10^{-1}, and 10^{-2}, respectively; the preexponential factors were found to be in good agreement with experimental data. For reaction IV the rate constant was calculated from transition state theory on the assumption that the weak H-Ar and O-Ar bonds in the activated complex are of the Van-der-Waals type. The calculated rate constant value was in good agreement with experiment (0.46×10^{-32} and 0.35×10^{-32} cm^6/mol^2 sec^{-1}, respectively). The zero-point activation energy for reaction IV was 2 kcal/mol. The steric factor for reaction IV, 2.9×10^{-3}, remained virtually constant with increasing temperature (rose very slightly). It was shown that taking into account the temperature dependence of the rate constant of reaction IV explains the nonagreement between the experimental values of the temperature increment of the upper pressure limit of hydrogen combustion and the calculated activation energy of reaction II. Orig. art. has: 2 tables, 4 figures and 16 formulas. [WA-68]

SUB CODE: 21, 07/ SUBM DATE: 16Oct65/ ORIG REF: 013/
OTH REF: 008

ACC NR: AP6034153 SOURCE CODE: UR/0076/66/040/010/2551/2559

AUTHOR: Stepukhovich, A. D.; Umanskiy, V. M.

ORG: Saratov State University (Saratovskiy gosudarstvennyy universitet)

TITLE: Preexponential and steric factors in certain elementary reactions of hydrogen combustion

SOURCE: Zhurnal fizicheskoy khimii, v. 40, no. 10, 1966, 2551-2559

TOPIC TAGS: hydrogen, hydrogen combustion, chemical reaction kinetics, reaction mechanism, combustion research

ABSTRACT: The kinetics of elementary reactions of hydrogen combustion at ~800K has been studied. A detailed calculation was performed of the preexponential and steric factors of the bimolecular reactions of chain propagation and branching,

$$\dot{O}H + H_2 \rightarrow H_2O + \dot{H} \quad (I)$$

$$\dot{H} + O_2 \rightarrow \dot{O}H + \cdot O \cdot \quad (II)$$

$$\cdot O \cdot + H_2 \rightarrow \dot{O}H + \dot{H}, \quad (III)$$

UDC: 541.124/128

Card 1/2

ACC NR: AP6034153

and of the trimolecular reaction of homogeneous chain breaking,

$$\dot{H} + O_2 + M \rightarrow \dot{H}O_2 + M. \qquad \text{(IV)}$$

where M = Ar. For reactions I—III the steric factors were found to be of the order of 10^{-3}, 10^{-1}, and 10^{-2}, respectively; the preexponential factors were found to be in good agreement with experimental data. For reaction IV the rate constant was calculated from transition state theory on the assumption that the weak H-Ar and O-Ar bonds in the activated complex are of the Van-der-Waals type. The calculated rate constant value was in good agreement with experiment (0.46×10^{-32} and 0.35×10^{-32} $cm^6/mol^2\ sec^{-1}$, respectively). The zero-point activation energy for reaction IV was 2 kcal/mol. The steric factor for reaction IV, 2.9×10^{-3}, remained virtually constant with increasing temperature (rose very slightly). It was shown that taking into account the temperature dependence of the rate constant of reaction IV explains the nonagreement between the experimental values of the temperature increment of the upper pressure limit of hydrogen combustion and the calculated activation energy of reaction II. Orig. art. has: 2 tables, 4 figures and 16 formulas. [WA-68]

SUB CODE: 21, 07/ SUBM DATE: 160ct65/ ORIG REF: 013/
OTH REF: 008

Card 2/2

STEPUKHOVICH, N.M.; YESKEVICH, Ye.I.; LOPATKIN, A.K.

New gas burner for rotary kilns. TSement 28 no.2:20-21 Mr-Ap '62. (MIRA 15:8)

1. TSementnyy zavod "Bol'shevik".
(Kilns, Rotary) (Gas burners)

ACC NR: AT6022259 SOURCE CODE: UR/0000/66/000/000/0080/0087

AUTHOR: Kurayev, A. A.; Stepukhovich, V. A.

ORG: none

TITLE: Using the variable isochronism of electron oscillations for enhancing the efficiency of phasochronous devices

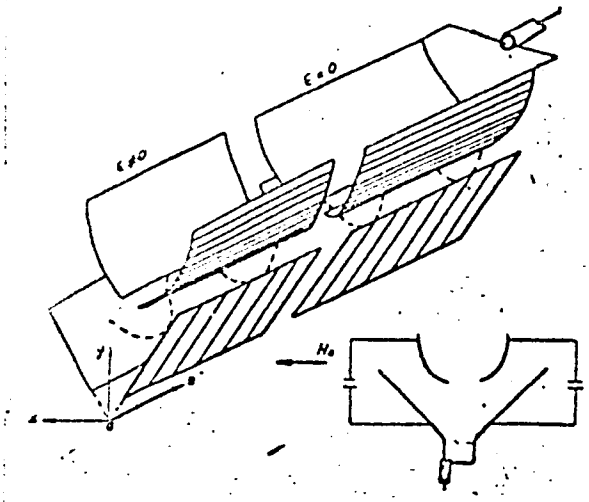
SOURCE: Vsesoyu znaya nauchnaya sessiya, posvyashchennaya Dnyu radio. 22d, 1966. Sektsiya elektroniki. Doklady. Moscow, 1966, 80-87

TOPIC TAGS: SHF amplifier, SHF oscillator, strophotron, traveling wave tube, backward wave tube

ABSTRACT: Four cascade arrangements are theoretically considered of a strophotron in whose first (bunching) sections the electron oscillations are non-isochronous while in the output sections the oscillations are isochronous. The SHF voltage is applied between the positive-electrode segments and between the negative plates (see figure); the strength of the field x-component is practically constant within a wide range of x. It is demonstrated that a system of equations describ[illegible]

Card 1/2

ACC NR: AT6022259



strophotron bunching section can be replaced by a system of nonlinear equations describing TW and BW tubes. The strophotron output section is described by another system of differential equations whose solution yields new equations that describe the amplitude and phase of the output SHF voltage. It is found that the maximum tube efficiency is independent of its gain parameter μ. A numerical example, which uses J. D. Rowe's results, shows that the above cascade strophotron has better than double the efficiency of the conventional strophotron. Orig. art. has: 3 figures and 28 formulas.

SUB CODE: 09 / SUBM DATE: 09Apr66 / ORIG REF: 001

Card 2/2

ACC NR: AP6019635 (A,N) SOURCE CODE: UR/0048/66/030/002/0371/0377

AUTHOR: Afanas'yev, N.G. Startsev, V.I.; Smelov, Ye.M.; Kuplennikov, E.L.; Stepula, Ye.V.; Petrenko, V.V.; Fursov, G.L.

ORG: none

TITLE: Investigation of elastic scattering of 70 MeV electrons on C-12 and Be-9 and the mean square radii of those nuclei /Report, Fifteenth Annual Conference on Nuclear Spectroscopy and Nuclear Structure, held at Minsk, 25 January to 2 February 1965/

SOURCE: AN SSSR. Izvestiya. Seriya fizicheskaya, v. 30, no. 2, 1966, 371-377

TOPIC TAGS: electron scattering, elastic scattering, form factor, nuclear radius, beryllium, carbon

ABSTRACT: The authors have measured the elastic scattering cross sections of C^{12} and Be^{9} for 70 MeV electrons at different scattering angles between 30 and 150° in order to evaluate the root-mean square radii of the nuclei. The 70 MeV electron energy was chosen for the measurements because at that energy the momentum transfers are high enough to permit determining the momentum transfer dependence of the form factor, and yet low enough to allow of neglecting higher powers than the second (of the momentum transfer) in the expression for the form factor. The electron beam was produced by a pulsed accelerator. The primary beam intensity was measured with a secondary emission monitor which was calibrated with a Faraday cup. The electrons that were

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ACC NR: AP6019635

2

elastically scattered at a given angle from the graphite[15], polyethylene[15] or beryllium foil target were focused with a magnetic field onto a Cerenkov counter which recorded them. The scattering angle at which scattered electrons were recorded could be changed without breaking the vacuum. In addition to the measurements with the Cerenkov counter measurements were realized with photographic recording of the scattered electrons. Although some of the corrections involved in the different techniques are different (the corrections are discussed at some length), the cross sections measured by the two different recording methods were in excellent agreement. The values obtained from the momentum transfer dependence of the form factor for the rms radii of Be^9 and C^{12} were 2.26 ± 0.1 and 2.35 ± 0.01 fermi, respectively. Orig. art. has: 12 formulas, 5 figures, and 3 tables.

SUB CODE: 20 SUBM DATE: 00 ORIG. REF: 004 OTH REF: 002

Card 2/2 hs

DUDNIK, T.M.; STARIKOV, L.A.; NEZHENTSEV, V.V.; DOPPEL'MAYYER, K.K.; STEPUN, A.O., otv.red.; OSVAL'D, E.Ya., red.izd-va; LOMILINA, L.N., tekhn.red.; SHKLYAR, S.Ya., tekhn.red.

[Principles of the analysis of mine economics] Osnovy analiza khozyaistvennoi deiatel'nosti shakhty. Moskva, Gos.nauchno-tekhn. izd-vo lit-ry po gornomu delu, 1959. 103 p. (MIRA 12:12)
(Mining industry and finance) (Mine management)

KOZUBENKO, Viktor Alekseyevich; LERNER, B.I., retsenzent; STEPUN, A.O., otv.red.; GOLUBYATNIKOVA, G.S., red.izd-va; PROZOROVSKAYA, V.L., tekhn.red.; BOLDYREVA, Z.A., tekhn.red.

[Planning in coal mines] Planirovanie na ugol'noi shakhte. Moskva, Gos.nauchno-tekhn.izd-vo lit-ry po gornomu delu, 1960. 303 p. (MIRA 13:7)
(Coal mines and mining)

KOSOVICH, Vasiliy Luk'yanovich; SMIRNOV, Viktor Sergeyevich, retsenzent; STEPUN, Aleksey Oskarovich, retsenzent; DOROKHIN, Nikolay Georgiyevich, otv. red.; LOMILINA, L.N., tekhn. red.

[Basic technical and economic calculations on mining operations and mining systems] Osnovnye tekhniko-ekonomicheskie raschety po provedeniiu vyrabotok i sistemam razrabotki. Moskva, Izd-vo "Nedra," 1964. 154 p. (MIRA 17:3)

STEPUN, O.A., [deceased], LOMAURI, A.I., AKHMETELI, G.S., CHIKVAIDZE, V.N., (Tbilisi)

Further data on biochemical properties of renin in the normal kidney and of renol, the pressor substance of rabbits kidney ischemized in vivo and of kidney autolyzed in vitro. Arkh.pat. 18 no.2:52-57 1956 (MIRA 11:10)

1. Iz otdela patokhimii (zav. - prof. O.A. Stepun) Instituta klinicheskoy i eksperimental'noy kardiologii A.N. GruzSSR (dir. - deystvitel'nyy chlen AN GruzSSR, prof. M.D. TSinamzdvarishvili).

(PROTEASES,
renin, differentiation from renol, pressor substance from kidney ischemia in vivo & kidney after autolysis in vitro (Rus))
(KIDNEYS,
isolation of pressor substance renol in ischemia in vivo & after autolysis in vitro (Rus))
(BLOOD PRESSURE, effect of drugs on,
pressor substance renol isolated from kidneys in ischemia in vivo & after autolysis in vitro (Rus))

STEPUNIN, Aleksey Nikolayevich; STEPUNINA, Inessa L'vovna; KAPELUSH, S.I., red.; SHAPOVALOVA, N.S., ml. red.

[Ethiopia] Efiopiia. Moskva, Mysl', 1965. 83 p. (MIRA 18:7)

KHAVCHENKO, Aleksandr Trofimovich; STEPANIN, Longin Vikulovich; SAPOZHNIKOV, M.B., red.; PAVLICHENKO, M.I., tekhn.red.

[A feeling for the new; work practices of the trade-union organization in the Novocherkassk Electric Locomotive Plant]. Chuvstvo novogo; iz opyta raboty profzoiuznoi organizatsii Novocherkasskogo elektrovozostroitel'nogo zavoda. Rostov-na-Donu, Rostovskoe knizhnoe izd-vo, 1956. 46 p. (MIRA 11:3)
(Trade unions)

BRAGINSKIY, V.B.; MINAKOVA, I.I.; STEPUNIN, P.P.

Low power absolute measurements in the microwave band. Prib. i tekh. eksp. 8 no.5:130-133 S-O '63. (MIRA 16:12)

1. Fizicheskiy fakul'tet Moskovskogo gosudarstvennogo universiteta.

L 63228-65 EWT(1) IJP(c)
ACCESSION NR: AP5016393 UR/0120/65/000/006/0183/0187 14
535.218:535.231.6-2 10 B

AUTHOR: Braginskiy, V. E., Minakova, I. I.; Stepunin, P. M.

TITLE: Absolute energy and power measurements in the visible wavelength range by registering the electromagnetic pressure 21

SOURCE: Pribory i tekhnika eksperimenta, no. 3, 1965, 183-187

TOPIC TAGS: absolute high energy measurement, absolute light momentum measurement, absolute light pressure measurement, visible light energy, electromagnetic pressure

ABSTRACT: The ponderomotor action of electromagnetic radiations has been used in the past for measuring the electromagnetic energy and momentum in the millimeter and centimeter wave range. Recently, various authors proposed (V. B. Braginskiy, I. I. Minakova, P. M. Suspunin, PTE, 1963, no. 5, 130; L. O. Cock, W. L. Flowers, C. B. Arnold, Proc. IRE 1962, 50, no. 7, 1736) and extension of this method to measurements in the visible region. The present paper describes the operating principles, design, and results of testing of such a device capable of absolute measurements of short light

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pulses in the 0.5-100 Joule range and of continuous radiation in the 2-500 .W range. It consists of an electronic device for small shift registration and contains a force calibration unit. Test pulses are 10-3 sec. long. The relative registration error is 2%; the relative accuracy during absolute readings is 22%. Estimates of the limits of applicability of the method and of the necessary registration time intervals are also given. "The authors thank L. P. Lisovskiy, L. A. Rivlin, and Ye. N. Volkova for assistance during the investigation." Orig. art. has: 6 formulas, 3 figures, and 1 table. [087]

ASSOCIATION: Fizicheskiy fakul'tet MGU (Physics Department, MGU)

SUBMITTED: 04May64 ENCL: 00 SUB CODE: EC, EM

NO REF SOV: 002 OTHER: 001 ATD PRESS: 4049

ALEKSANDROV, Igor' Nikolayevich; KRASNOVSKIY, Andrey Zakharovich; STEPUNIN, S.Ye., inzh.,red.; ZEYLIDZON, Ye.D., inzh., retsenzent; LARIONOV, G.Ye., tekhn.red.

[Automatic reclosing on individual electric transmission lines with two-way feed] Avtomaticheskoe povtornoe vkliuchenie odinochnykh linii elektroperedachi s dvustoronnim pitaniem. Moskva, Gos. energ. izd-vo, 1958. 94 p. (MIRA 12:1)
(Electric circuit breakers) (Electric lines)

STEPUNIN, S.Ye., inzh.; STREIKOV, V.M., inzh.; TSAREV, M.I., inzh.;
TSAREV, M.I., kand.tekhn.nauk

Improvement of three-phase automatic reclosing systems.
Elek.sta. 31 no.5:69-74 My '60. (MIRA 13:8)
(Electric switchgear) (Electric lines)

STEPUNIN, S.Ye., inzh.

Behavior of overcurrent protection at asynchronous operating conditions in an electric power system. Elektrichestvo no.10: 55-60 O '61. (MIRA 14:10)

1. Vsesoyuznyy nauchno-issledovatel'skiy institut elektroenergetiki.

(Electric power distribution)
(Electric protection)

STEPANIN, S.Ye., inzh.

Action of a block system in the presence of swaying based on the comparison of real and reactive power. Elek. sta. 32 no.2:64-68 F '61. (MIRA 16:7)
(Electric power distribution)
(Electric protection)

STEPUNIN, S.Ye., inzh.

Device exhibiting nonsynchronous operation in an electric power system. Trudy VNIIE no.15:21-47 '63. (MIRA 16:12)

KURYS EV, V.I.; GUSEV, Ye.B.; STEPUNINA, V.A.

Bright fireballs over Ryazan. Astron.tsir. no.205:28-29 O '59.
(MIRA 13:6)

1. Pedinstitut, Ryazan' i Ryazanskoye otdeleniye Vsesoyuznogo astronomo-geodezicheskogo otdeleniya.
(Meteors)

Sirotin, I. F.

PHASE I BOOK EXPLOITATION SOV/4706

Akademiya nauk SSSR. Institut elektromekhaniki

Sbornik rabot po voprosam elektromekhaniki, vyp. 4: Elektricheskiye mashiny, elektricheskiy privod, elektricheskaya tyaga na peremennom toke, avtomatizirovannyy elektroprivod teleskopov, avtomaticheskoye regulirovaniye i pribory (Collection of Works on Problems in Electromechanics, No. 4: Electric Machines, Electric Drive, A-C Electric Traction, Automated Electric Drive of Telescopes, Automatic Regulation and Instruments) Moscow, 1960. 282 p. 5,500 copies printed.

Resp. Ed.: V. V. Kidel'nikov; Ed. of Publishing House: I. V. Suvorov; Tech. Ed.: R. A. Zamarayeva.

PURPOSE: This collection of works is intended for specialists in electromechanics.

COVERAGE: The collection contains 28 works divided into three sections: 1) Electric Machines, 2) Electric Drive and Electric Traction; 3) Automated Electric Drive, and Automatic Regulation and Instruments. No personalities are mentioned. References accompany most of the articles.

AUTOMATED ELECTRIC DRIVE. AUTOMATIC REGULATION AND INSTRUMENTS

(2)

S/194/62/000/006/061/232
D295/D308

AUTHORS: Sakhmanov, A.V., Semenov, V.V., and Stepura, E.F.

TITLE: Optimum operating conditions of a symmetrical twin T-shaped bridge in an electro-hydraulic control system of water-turbine speed

PERIODICAL: Referativnyy zhurnal. Avtomatika i radioelektronika, no. 6, 1962, abstract 6-2-149 u (Sb. rabot po vopr. elektromekhan., In-t elektromekhan AN SSSR, no. 5, 1961 95-98)

TEXT: It is suggested to use, in circuits determining the deviation of the output frequency of the generator from its set value, a twin T-shaped bridge instead of induction coils with a steel core or tuning forks, which not only increases the stability of the circuit characteristics, but also permits to regulate the slope of the characteristic of the frequency-deviation detector by varying the voltage applied at the input of the bridge. An investigation is carried out of a twin T-shaped bridge having as the load the control windings of a magnetic amplifier. On the basis of equations descri-

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bing the steady-state operating conditions of the bridge, an expression is found for the slope of the frequency dependence of the in-phase current component in the load resistance, and the optimum value of the transformation ratio of the matching transformer is found for which this slope is a maximum. 7 references. [Abstractor's note: Complete translation.]

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31030
S/573/61/000/005/022/023
D201/D305

9,2530

AUTHORS: Semenov, V.V., and Stepura, E.F.

TITLE: Increasing the pass-band of a magnetic amplifier by means of feedback delay

SOURCE: Akademiya nauk SSSR. Institut elektromekhaniki. Sbornik rabot po voprosam elektromekhaniki. no. 5, Moscow, 1961. Avtomatizatsiya, telemekhanizatsiya i priborostroyeniye, 321 - 324

4

TEXT: In many practical cases the magnetic amplifiers operate with heavy negative feedback which increases the pass-band and the amplifier gain. It is shown in the present article that by introducing a delay into the feedback circuit an additional increase of the pass-band may be obtained. Let the amount of feedback be determined by factor β and its delay by the time constant T_o. Let the amplifier parameters be k_a and T_a without feedback. Then after introducing the feedback the magnetic amplifier must have a gain k and a maximum possible pass-band. This corresponds to a certain va-

Card 1/

Increasing the pass-band of a ...

lue of T_o which has to be determined. Presenting the transfer junction of the amplifier in the form of a second order circuit

$$W(p) = k \frac{pT_o + 1}{p^2T^2 + 2\zeta Tp + 1}$$

4

is obtained, where

$$T = \sqrt{\frac{T_a T_o}{1 + \beta k_a}}; \qquad \zeta = \frac{T_a + T_o}{2\sqrt{T_a T_o (1 + \beta k_a)}}.$$

The shape of the resulting frequency response of the amplifier with delay in the feedback circuit is therefore determined by coefficient ζ and the ratio of T and T_o. Putting $\alpha = T/T_o$ and choosing T_o so that

$$T_o = \frac{T_a}{\alpha^2(1 + \beta k_a)}$$

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Increasing the pass-band of a ...

The attenuation coefficient is then given by

$$\zeta = \frac{\alpha}{2} + \frac{1}{2(1 + \beta k_a)} .$$

If $\beta k_a \gg 1$, then $\zeta \approx \alpha/2$. The results are shown in Fig. 2, where $\Omega = \omega/\omega_o$; ω_o being given by

$$\omega_o = \frac{1 + \beta k_a}{T_a} .$$

4

In Fig. 2, curve 1 represents the frequency response of magnetic amplifier with heavy negative feedback without delay. Curve 2 is for $\zeta = \alpha/2 = 0.6$ and $T = 1/1.2\omega_o$. The numerator ot the transfer function is represented by curve 3 when $[illegible]_o = 1/\alpha^2\omega_o = 1/1.44\omega_o$. Curve 4 is the sum of [illegible] and 3 and represents the frequency response of magnetic amplifier with delayed negative feedback, showing that the pass-band is approximately equal to 1.85 Ω. It may be shown that the above method may be considered from the point of

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Increasing the pass-band of a ...

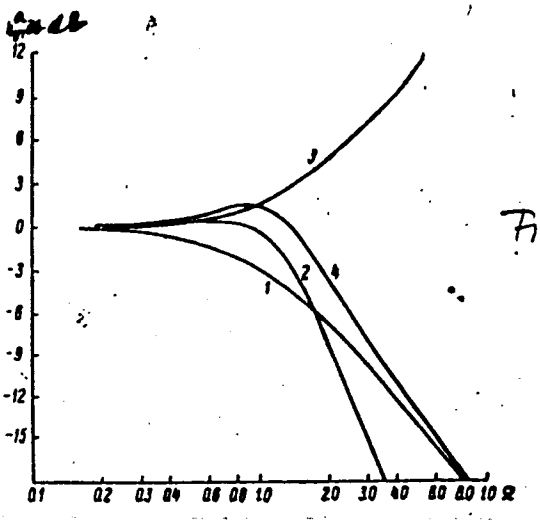
view of the result obtained as the introduction of a variable positive feedback. As opposed to it, it does not require however, any additional windings of the amplifier. There are 2 figures and 2 Soviet-bloc references.

4

Card 4/5

Increasing the pass-band of a ...

Fig. 2.



Card 5/5

S/275/63/000/002/016/032
D405/D301

AUTHORS: Semenov, V.V., Stepura, E.F., Tarasov, V.A. and Fomina, Ye.N.

TITLE: An application of simulation equipment in electroencephalographic investigations

PERIODICAL: Referativnyy zhurnal, Elektronika i eye primeneniye, no. 2, 1963, 9, abstract 2V49 (Dokl. 4-y Mezhvuz. konferentsii po primeneniyu fiz. i matem. modelirovaniya v razlichn. otraslyakh tekhn. v. 3, M., 1962, 281-285)

TEXT: A band filter with two resonance circuits was selected as the basic equipment for simulation. The simulation circuits were designed in such a way, so as to serve as permanent networks in the electro-encephalographic equipment. The operational d.c.-amplifiers developed for the filter models, have a gain factor of about 1000. Owing to the selection of a 2-stage parallel compensation circuit, zero tuning is carried out only when replacing tubes and during general adjustment of the setup. The simulation of the

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An application of simulation ... S/275/63/000/002/016/032
D405/D301

equations of the band filter with resonance circuits was effected by means of 4 integrators and a summator. In distinction to actual LC-filters, which owing to their size are not feasible within the frequency-range used in electro-encephalography, and to circuits incorporating twin-T filters and line repeaters of higher complexity which are very difficult to tune, the model-filter is free of these shortcomings. The model-filter ensures a specified passband width of adequate uniformity within the passband and sufficient attenuation-steepness; it is easy to retune and has high input impedance and low output impedance. The model constructed is used for singling out various rhythms from the electro-encephalogram for their quantitative and qualitative evaluation during fixed intervals of time. The quantitative estimate of the mean activity of the various rhythms and of the integral curve is effected by means of operational integrator-amplifiers. For convenience, the integration result is converted into digital form. A calibration oscillator was developed for testing and calibration of all the channels of the electro-encephalographic setup; it too, utilizes operational amplifiers. The setup can also be used for other investigations. 2 references.
[Abstracter's note: Complete translation]

Card 2/2

S/573/62/000/007/015/015
D201/D308

AUTHORS: Semenov, V.V., Stepura, E.F., Tarasov, V.A. and Fomina, Ye.N.

TITLE: An electronic pass-band filter for an EEG pattern analyzer

SOURCE: Akademiya nauk SSSR. Institut elektromekhaniki. Sbornik rabot po voprosam elektromekhaniki. no. 7, 1962. Avtomatizatsiya, telemekhanizatsiya i priborostroyeniye, 373-375

TEXT: The authors show the possibility of designing very low frequency pass-band filters using electronic analog techniques. An analog of a passive pass-band LC filter is taken as an example. It consists of 4 integrators and an adder for sign inversion. An experimentally designed filter of the analog type had a 3 db pass-band of 4 c/s at a center frequency of 9 c/s. The filter was used to detect the α-rhythm. These filters, having a very high input impedance, may be easily connected to other instruments, their tun-

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ACCESSION NR: AT4035417 S/0000/63/000/000/0257/0264

AUTHOR: Stepura, E. F.; Semenov, V. V.

TITLE: The use of magnetic amplifiers for multiplying two or more electrical signals

SOURCE: Vsesoyuznoye soveshchaniye po ferritam i po beskontaktny*m magnitny*m elementam avtomatiki. 3d, Minsk. Ferrity* i beskontaktny*ye elementy* (Ferrites and noncontact elements); doklady* soveshchaniya. Minsk, Izd-vo AN BSSR, 1963, 257-264

TOPIC TAGS: computer, multiplication, magnetic amplifier, product unit

ABSTRACT: A common magnetic throttle amplifier with bridge-circuited alternating-current coils was examined as the product unit in a study of its possible use for multiplication. As seen from the equation for the outlet voltage of a magnetic bridge amplifier

$$U_a = \frac{A}{1 + \varkappa F_c} U_\sim I_y. \qquad (1)$$

where A is the coefficient of proportionality, $U_\sim$ is the feed voltage, I_y is the current in the amplifier, $\varkappa$ is a throttle constant, depending on the core material and geometrical dimensions, and F_c is the magnetizing coil force, to secure more accurate multiplication results it is necessary to make the quantity A as nearly constant as possible, which can be achieved

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either by cascade interconnection of the magnetic amplifiers, or by functional modification of the initial bias of the magnetic amplifier so that within a given range of the variables I_y and $U\sim$

$$\frac{A}{1+\varkappa F_c} = \text{const.} \qquad (2)$$

The product unit constructed by the authors has the following technical characteristics: the saturation throttle cores are made of E-42 steel with 1500, 650, 185, and 800 turns in the alternating current, bias, balance and control coils, respectively; the total resistance in the balance coil circuit is 220 ohms; $I_0 = 200$ ma the magnetizing force = 160 ampere-turns; $I_y \leq 0.12$ a; $U\sim \leq 60$ v, and the feed voltage frequency = 50 cps. Products of three and more variables as well as integer powers of one variable as well as integer powers of one variable can be obtained by means of the product unit. Orig. art. has: 15 figures and 8 formulas.

ASSOCIATION: none

SUBMITTED: 04Dec63 DATE ACQ: 07May64 ENCL: 00

SUB CODE: DP NO REF SOV: 006 OTHER: 003

Card 2/2

VOLKOV, A.A.; SEMENOV, V.V.; STEPURA, E.F.

Problems concerning the control of a diesel-electric drive. Sbor. rab. po vop. elektromekh. no.9:154-160 '63. (MIRA 17:2)

SAKHMANOV, A.V.; SEMENOV, V.V.; STEPURA, E.F.

Regulation of the velocity of a hydraulic turbine-generator unit with consideration of perturbations. Sbor. rab. po vop. elektromekh. no.9: 314-323 '63.

Network for the automatic control of traction motor load. Ibid.:145-153 (MIRA 17:2)

SEMENOV, V.V.; STEPURA, E.F.

Some problems concerning the automatic control of diesel locomotives. Sbor.rab.po vop.elektromekh.no 8:345-350 '63. (MIRA 16:5)

(Diesel locomotives) (Automatic control)